Tanta University
Faculty of Engineering
Dept. of Electronics & Communication Eng.
Subject: Microprocessor & Digital Control (3rd year لائحة قديمة)

Date: 24/6/2010
Time allowed: 180 Min.
Full Mark: 70 Mark
Final Term Exam (2nd Semester)

Answer The Following Questions (ملحوظة هامة: الأسئلة في ورقتين)

The First Question

(a) State the main tasks performed by microprocessor for the computer system.
(b) Draw a block diagram showing:
   1- The structure of the microprocessor-based personal computer system..
   2- The memory map of a personal computer.
(c) Compare between **IO.SYS** and **COMMAND.COM**.

The Second Question

(a) Protected mode memory addressing allows access to which area of the memory in:
   1- The **80286** microprocessor
   2- The Pentium II microprocessor.
(b) If the DS register shown in Fig. 1. contains **0040**H in a protected mode system, which global descriptor table entry is accessed.

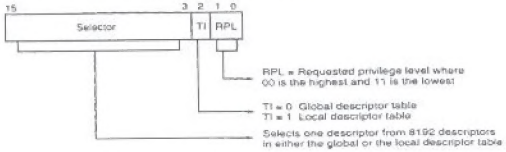


Fig. 1. Segment register during protected mode operation.

(c) Give the format of code a descriptor that describes a memory segment that begins at location **03000000**H and ends at location **05FFFFFF**H. This memory segment is a data segment that grows upward in the memory system and can be written. The descriptor formats for the **80386** and the access rights byte for the **80386** descriptor are given in Figs. (2-3).

80386/80486/Pentium/Pentium Pro/Pentium II descriptor

7	Base (B31–B24)	G	D	0	A V	Limit (L19–L16)	6
5	Access rights		Base (B23–B16)				4
3	Base (B15–B0)						2
1	Limit (L15–L0)						0

Fig. 2. The descriptor formats for the 80386.

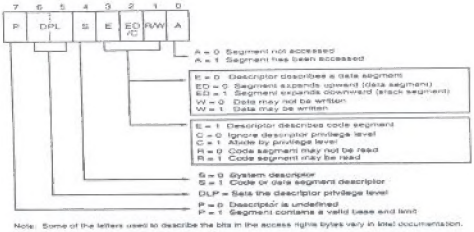


Fig. 3. The access rights byte for the 80286 descriptor.

The Third Question

(a) What is wrong with:

1- The **MOV BL,CX** instruction.
2- The **MOV DS,SS** instruction.
3- The **MOV [BX],[DI]** instruction

(b) Explain the difference between the **MOV BX,DATA** instruction and the **MOV BX,OFFSBT DATA** instruction

(c) Suppose that **DS = B1300H**, **SS = 1400H**, **BP = 1500H**, and **SI = 0100H**. Determine the address accessed by each of the following instructions, assuming real mode operation:

1- **MOV EAX,[BP+200H]**
2- **MOV AL,[BP+SI-200H]**

The Fourth Question

(a) If a **MOV WORD PTR [BX+1000H],1234**H instruction appears in a program for the Pentium II microprocessor operating in the 16-bit instruction mode, what is its machine language equivalent. **Hint**: Use both Table 1 and Table 2.

Table 1. MOD field for the 16-bit instruction mode.

MOD	*Function*
00	No displacement
01	8-bit sign-extended displacement
10	16-bit displacement
11	R/M is a register

Table 2. 16-bit R/M memory-addressing modes.

R/M Code	*Addressing Mode*
000	DS:[BX+SI]
001	DS:[BX+DI]
010	SS:[BP+SI]
011	SS:{BP+DI]
100	DS:[SI]
101	DS:[DI]
110	SS:[BP]*
111	DS:[BX]

(b) Explain what happens when the **PUSH AX** instruction executes. Make sure to show where **AH** and **AL** are stored. (Assume that **ESP = 07FE**H and **SS = 0300**H.)

(c) Develop a near procedure that fill the **300** bytes block of memory in the extra segment beginning at address **BLOCK** with the data byte 30H (ASCII space).

The Fifth Question

(a) Describe how the **LDS BX,NUMB** instruction operates

(b) Draw a block diagram showing::

1- Addition with carry.
2- Subtraction with barrow.

(c) Develop a near procedure to input two **8-bit** numbers from input ports **C0**H and **B0**H and output the product to **16-bit** output port **AF80**H.

With my best wishes

Tanta University
Faculty of Engineering
Dept. of Electronics & Communication Eng.
Subject: Microprocessor Applications in Communications Systems

Date: 24/6/2010
Time allowed: 180 Min.
Full Mark: 75 Mark
Final Term Exam (2nd Semester)

(ملحوظة هامة: الأسئلة في ورقتين)

Answer The Following Questions

The First Question

(a) Compare between 80486DX, Pentium, Pentium Pro, and Pentium 4 in terms of number of execution units (CPU) and size of cache memory.

(b) State briefly the function of:
1- USB.
2- AGP.

(c) Draw a block diagram showing:
1- The system area of a typical personal computer
2- The memory map of the TPA in a personal computer.

The Second Question

(a) If the DS register shown in Fig.1 contains 0020H in a protected mode system, which global descriptor table entry is accessed?

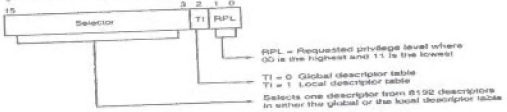


Fig. 1. Segment register during protected mode operation.

(b) For a Pentium 4 descriptor that contains a base address of 00280000H, a limit of 00010H, and G = 1, what starting and ending locations are addressed by this descriptor?

(c) How many descriptors are accessible in the global descriptor table in the protected mode?

The Third Question

(a) Select an instruction for each of the following tasks:
1- copy EBX into EDX
2- copy BL into CL
3- copy DS into AX

(b) What is a displacement. How does it determine the memory address in a MOV [2000H], AL instruction.

(c) Suppose that DS = 1100H, BX = 0200H, LIST = 0250H, and SI = 0500H, determine the address accessed by each of the following instructions, assuming real mode operation:
1- MOV LIST[SI],EDX
2- MOV CL,LIST[BX+SI]

The Fourth Question

(a) Convert an 8BEC from machine language to assembly language. Hint: Use both Table 1 and Table 2.

Table 1. MOD field for the 16-bit instruction mode.

MOD	Function
00	No displacement
01	8-bit sign-extended displacement
10	16-bit displacement
11	R/M is a register

Table 2. REG and R/M (MOD = 11).

Code	W=0 (Byte)	W = 1 (Word)	W= 1 (Doubleword)
000	AL	AX	EAX
001	CL	CX	ECX
010	DL	DX	EDX
011	BL	BX	EBX
100	AH	SP	ESP
101	CH	BP	EBP
110	DH	SI	ESI
111	BH	DI	EDI

(b) Explain what happens when the POP BX instruction executes. Make sure to show the contents of BH and BL. (Assume that ESP = 1008H and SS = 0000H).

(c) Write a program to output the word of data in **BX** to I/O ports **8004H** and **8005H.**

The Fifth Question

(a) Draw a block diagram showing::

1- Addition with carry.

2- Subtraction with barrow.

(b) Develop a near procedure that stores **AL** in **five** consecutive memory locations, within the data segment, as addressed by the **DI** register

(c) Write a program to add **10-byte** of memory in data segment beginning at address **SET**. Store the result in memory location **SUM**.

The Sixth Question

(a) What is wrong with:

1- The MOV BX,ECX instruction.

2- The MOV CS,DS instruction.

3- The MOV [SI],[DI] instruction.

(b) Develop a short sequence of instructions that **clears (0)** the three leftmost bits of **DH** without changing the remainder **DH** and stores the result in **BH**.

(c) Write a program to output **256** bytes from data table beginning at address **TABLE** to output port **A0H**.

With my best wishes

TANTA UNIVERSITY *15/6/ 2010*

FACULTY OFENGINEERING *TIME ALLOWED: 3 HOURS*

ELECTRONICS&COMMUNICATIONS DEP. *3rd YEAR COMMUNICATION*

FINAL EXAMINATION

SUBJECT: WAVE PROPAGATION II

1-a-Compare the received signal levels (in dB) of the surface wave component at a distance of 600 Km assuming the ground parameters as $\sigma = 0.01$ *and* $\varepsilon_r = 36$ if frequency is 900 KHz.

b- Write down an expression for and sketch the space-wave attenuation function due to ground reflection in the UHF frequency limit, then, derive the expression for the maximum line-of-sight (MLOS) distance due to earth's curvature, indicating clearly the correction made to the obtained MLOS distance due to the effect of the tropospheric refraction.

c- Write down short notes about the standard atmosphere, Ducting and critical refraction modes indicating the meteorological conditions affecting each of them.

d- A 300 MHz radio wave link is operating over a distance of 90 km using an antenna height of 16 m at transmitter. Estimate a suitable value of the receiver antenna height that ensures LOS if the refractivity gradient is $\frac{dN}{dh} = -0.08 \quad m^{-1}$

2-a- Define the critical frequency, Fc , and the maximum usable frequency , MUF , of an ionospheric layer. What is the range on earth over which the waves can be received due to the reflection from an ionospheric layer

b- If the ionization profile of the ionosphere can be approximated by:

$N(h) = 16x10^{12}[1-(\frac{h-300}{300})^2]$ where h is the height in Km,

i- Sketch the ionization profile $N(h)$.

ii- calculate F_c ,and the maximum usable frequency, MUF of the layer for normal incidence.

iii- If a plane wave is incident at an angle $\theta_i = 60^0$, check if the following frequencies can be reflected or not. If they can, calculate the height of reflection and the range on earth over which the waves can be received, and if they can't, estimate another suitable value for θ_i

$f_1 = 14.4\,MHz$, $f_2 = 28\,MHz$.

c- i- Show briefly the main parameters affecting the satellite communication system, then, show why the microwave band is selected for its operation.

ii- For the INTELSAT IV system, calculate the required transmitted power to ensure the reception of 10^{-12} watts through the fifth transponder with the following parameters: the gain of the transmitting earth station $G_1 = 30\,dB$, the gain of the receiving earth station $G_2 = 25\,dB$, the gain of the receiving antenna of the satellite is $G_{sr} = 20\,dB$, the gain of the transmitting antenna of the satellite is $G_{st} = 20\,dB$ and the effective gain of the satellite system $G_0 = 40\,dB$

3- **a-** Write the general expression for the far field radiation from the long wire antenna then, obtain an expression for the far field pattern of $\lambda/2$ dipole.

b- Plot the radiation pattern and evaluate the directivity, radiation resistance , effective length and beam width of the following linear antennas:

i- A dipole of length 50 cm, operating at 300 MHz

ii- A monopole of height 75 m, operating at 1 MHz

iii- A folded dipole of length 5 cm, operating at 300 MHz.

c- Write down an expression for the far field radiation from a rectangular loop antenna that placed in the x-y plane assuming constant current ,then plot its radiated pattern if the loop dimensions is $2\lambda x\lambda$.

d- Write down an expression for the far field radiation from a circular loop antenna that placed in the x-y plane assuming constant current , then plot the far field patterns and evaluate Rrad ,D and beam width for the following cases:

i- A loop antenna of radius 30 cm operating at 1500 MHz.

ii- A loop antenna of radius 10 cm operating at 300 MHz.

4-a- Write down the far field radiation pattern of a traveling wave antenna with length L, and then, Plot its pattern if its **first sidelobe** is assumed to be directed to 60^0 tabulating the directions of nulls, peaks and relative peak amplitudes, then design its rhombic antenna.

b- i- Write down an expression for the radiated field from a uniform illumination rectangular aperture.

ii- For a uniform illumination rectangular aperture antenna , if the E - field is in Y – direction ,the 3-dB beam width in the E plane is assumed to be 17^0 and the directivity is 22.753 dBs, **estimate** the aperture dimensions and then , sketch the E and H plane patterns .

"ربِّ اشرح لي صدري ويسر لي أمري"

Dr. Abdel-Fattah A. Abu-Hashem

Tanta University

Department: Electronics and Electrical Communication Eng.
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Electronic Communication Systems	Course Code: EE3202	Year: 3rd
Date: 15/6/2010 (Second term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...Neat answers and boxed results are appreciated)

Question 1

(a) Explain the fundamental limitations of any communication system.
(b) List the major types of external and internal noise.
(c) Define the thermal noise. Derive an expression for thermal power in a resistor at temperature T °K.
(d) Calculate the noise voltage at the input of television RF amplifier, using a device that has a 200 ohm equivalent noise resistance and 300 ohm input resistor. The bandwidth of amplifier is 6 MHz and temperature 17°C.

Question 2

(a) List the benefits of a superheterodyne over a TRF receiver.
(b) Sketch the block diagram of Super-heterodyne receiver. Identify the function of each component.
(c) An AM standard broadcast receiver is to be designed having an intermediate frequency (IF) of 455 kHz. Calculate the required frequency that the local oscillator should be at which the receiver is tuned to 540 kHz if the local oscillator tracks below the frequency of the received signal.

Question 3

Design a FDMA system for multiplexing 4 signals. Three of these signals are band-limited to 4 kHz, while the fourth one is band-limited to 12 kHz. The first carrier available is 200 kHz and a guard band of 1 kHz is used.
(a) Draw the spectrum of the composite signal and determine the required bandwidth if DSB and SSB are used.
(b) Sketch the block diagram of the transmitter.
(c) Sketch the block diagram of the receiver.

Question 4

(a) Sketch the block diagram of Stereophonic FM (transmitter and receiver). Sketch the spectrum of signal output at each block diagram.

(b) Design the block diagram of an Armstrong FM modulator to generate an FM carrier with a carrier frequency of 98.1 MHz and Δf of 75 kHz. A narrow band FM generator is available at a carrier frequency of 100 kHz and a frequency deviation of 10 Hz. The adjustable frequency range for oscillator is from 10 to 11 MHz.

(c) Explain the function of AFC.

(d) Explain the function of PLL as FM detector.

Best Wishes of Success

Academic Year 2009/2010	Faculty of Engineering - Tanta University		
	Communications and Electronics Department		Final Exam – 3rd Year
		Digital Signal Processing (DSP)	June, 2010
	Lecturer:	Dr. Mohamed Abd El-Rahman	Time allowed: 3 hrs.

Answer the Following Questions — Neat answers and boxed results are appreciated

Question 1:

a) A linear time invariant system is described by the difference equation:

$$y(n) = \frac{3}{2}y(n-1) + y(n-2) + x(n-1)$$

Specify the region of convergence ROC of $H(z)$ and determine $h(n)$ for the following conditions:

i) stable system.
ii) the system is causal.
iii) the system is purely anticausal.

b) Determine the crosscorrelation sequence $r_{xy}(\ell)$ of the sequences

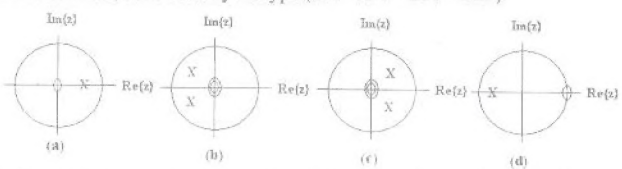
$$x(n) = \{...0, 0, 2, -1, 3, 7, \underset{\uparrow}{1}, 2, -3, 0, 0....\}$$

$$y(n) = \{....0, 0, 1, -1, 2, -2, \underset{\uparrow}{4}, 1, -2, 5, 0, 0....\}$$

c) Discuss and analyze the digital correlator in radar systems. Also write down the relationship between the two processes: correlation and convolution.

Question 2:

a) For the following pole-zero diagrams, Derive the frequency response $H(z)$ for each one of them, then classify its type (LPF- HPF - BPF - BSF).



Hint: Consider the pole radius r in all figures a, b, c, d and angle ω_o for the conjugate poles in b, c.

b) Design a notch filter with notch frequency 60 Hz, stopband 5 Hz and sampling frequency 300 Hz. Plot its pole zero pattern and realize the obtained $H(z)$.

Question 3:

Low pass filter described by first order discrete time system with the impulse response $h(n) = (0.5)^n u(n)$ and the input composite signal is given by:

$$x(n) = 10 - 5\sin\left(\frac{\pi}{2}\right)n + 20\cos(\pi)n$$

a) Find the system function $H(z)$ and region of convergence (ROC).

b) Using the pole-zero placement method, sketch the frequency response $H(e^{j\omega})$ in magnitude and phase.

c) Find the output sequence of the system $y(n)$ due to the input sequence $x(n)$.

d) Write a MATLAB program to compute the magnitude and phase responses.

PTO

Question 4:

Assuming that the sampling frequency is 400 Hz, design a band pass filter with the following specifications.

a) Complete signal rejection at dc and 200 Hz.
b) Narrow pass-band centered at 100 Hz.
c) 3dB bandwidth of 8 Hz.

Evaluate the first fifth values of its impulse response. Also realize the obtained H(z) using the direct form I and direct form II methods

Question 5:

a) Aided with the pole-zero configurations, explain the four possible types of symmetric sequences for the linear phase filters.

b) Derive an expression of the frequency response for the type with even length and even symmetry.

c) Determine a linear phase FIR filter, whose length is 4 and for which $H(0) = 1$ and $H_r(\pi/2) = 0.5$

Tanta University

Department: Electronics and Electrical Communication Eng.
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Digital Communication Systems	Course Code: EEC 322-D	Year: 3rd
Date: 20/6/2010 (Second term)	Allowed time: 3 hrs	No. of Pages: (3)

Remarks: (answer the following questions… assume any missing data… answers should be supported by sketches, equations …Neat answers and boxed results are appreciated).

Question 1

(a) Consider the random process $Z(t)=1Y+3Xt$. Where X and Y are independent random variables; X has a uniform distribution over the interval [-1, 1], Y has $\mu_Y=2$ and $E(Y^2)=6$. Find $\mu_Z(t)$ and $R_Z(t_1,t_2)$.

(b) Consider a random process $X(t)=\sin(2\pi f_c t)$; in which the frequency f_c is a random variable uniformly distributed over the interval [0, W]. Is this process WSS? Why?

Question 2

(a) An information signal with spectrum $M(f)=rect(\frac{f}{2B})$ is flat top sampled with pulses having duration $T=T_s/2$. The sampling frequency $f_s=2.5B$. Sketch the spectrum of the sampled signal $S(f)$. Do you think an equalizer is required for the signal recovery?

(b) Derive the power spectral density of the Polar NRZ line code to confirm that:

$$S(f)=A^2T_b\,\mathrm{sinc}^2(fT_b)$$

(c) A compact disc (CD) recording system samples an audio signal with a 16 bit ADC with a sampling rate 44100 samples/sec.

i. Determine the output signal to noise ratio for a full scale sinusoid.
ii. Find the output bit rate of this recording system.
iii. If this CD can store one music file with duration of 1 hour, determine the number of bits recorded on this CD.
iv. For comparison, a good dictionary may contain 1500 pages, 2 columns/page, 100 lines/column, 7 words/line. 6 litters/word, and 6 bits/letter. Determine how many dictionaries can be stored on this CD.

Question 3

(a) Compare between ASK, Coherent BPSK, DPSK, and QPSK; from the point of view of P_e (Support your answer with sketches and equations as possible).

(b) Deduce an expression for the probability of error in the presence of an additive white Gaussian noise (AWGN) affecting a binary PCM system based on Unipolar-NRZ signalling.

P.T.O

(c) A coherent BPSK system makes errors at the average rate of 100 errors per day. The data rate is 1000 bit/sec. The single-sided power spectral density of noise is $N_0 = 10^{-10}\ W/Hz$.

i. Find the average probability of error P_e.

ii. If the average power of the received signal is $P_b = 9\times10^{-7}\ W$, will this power be adequate to maintain the probability of error found in part (i)?

Question 4

(a) The binary sequence 1011010011 is transmitted over a communication channel using DPSK. The channel introduces a 180° phase reversal.

i. Sketch the transmitted DPSK waveform, assuming an initial bit of "1". What is the effect of changing the initial bit to "0".

ii. Show that the DPSK detector in the receiver reproduces the original binary sequence, despite of 180° phase reversal in the channel (Assume that the channel is noise-free).

(b) The input binary sequence "10110100" is applied to QPSK transmitter

i. Sketch the block diagram of QPSK transmitter.

ii. Sketch the waveform for the specified input sequence (assume that the carrier frequency equals the bit rate).

Question 5

(a) For spread spectrum techniques:

i. What is meant by spread spectrum modulation?

ii. What are the applications of these techniques?

iii. State the primary advantages and disadvantages.

(b) In a DS/BPSK system, a feedback shift register with length $m = 15$ flip-flops is used to generate the PN sequence. The system is required to have an average probability of symbol rate due to externally generated interfering signals that does not exceed 10^{-6}. Calculate the processing gain and jamming margin.

Good Luck for All

The error function[a]

u	$erf(u)$	u	$erf(u)$
0.00	0.00000	1.10	0.88021
0.05	0.05637	1.15	0.89612
0.10	0.11246	1.20	0.91031
0.15	0.16800	1.25	0.92290
0.20	0.22270	1.30	0.93401
0.25	0.27633	1.35	0.94376
0.30	0.32863	1.40	0.95229
0.35	0.37938	1.45	0.95970
0.40	0.42839	1.50	0.96611
0.45	0.47548	1.55	0.97162
0.50	0.52050	1.60	0.97635
0.55	0.56332	1.65	0.98038
0.60	0.60386	1.70	0.98379
0.65	0.64203	1.75	0.98667
0.70	0.67780	1.80	0.98909
0.75	0.71116	1.85	0.99111
0.80	0.74210	1.90	0.99279
0.85	0.77067	1.95	0.99418
0.90	0.79691	2.00	0.99532
0.95	0.82089	2.50	0.99959
1.00	0.84270	3.00	0.99998
1.05	0.86244	3.30	0.999998

Tanta University	Dept.: Elect. & electrical communications Total Mark: 85 Marks	Faculty of Engineering

Course Title: Acoustics and Ultrasonics	Course Code: EEC	Year: Third
Date: / 6 /2010	Time Allowed: 3 Hours	No. of Pages:2

Remarks: (Answer the following questions…assume any missing data…answers should be supported by sketches)

Problem number (1) **10 Marks**

a- A plane sound wave is transmitted through air (R = 287 J/kg-K) at 25C (298.2 K or 77 F) and 101.3 kPa. The speed of sound in the air is 346.1 m/s. The sound wave has an acoustic pressure (rms) of 0.90 Pa. Determine the rms acoustic particle velocity.

b- A plane sound wave is transmitted through air (speed of sound, 346.1 m/s; characteristic impedance, 409.8 rayl) at 25 C (298.2K or 77 F) and 101.3 kPa. The sound wave has an acoustic pressure (rms) of 0.40 Pa. Determine the acoustic intensity and acoustic energy density for the sound wave.

Problem number (2) **15 Marks**

a- A source of sound radiates symmetrically with the following directional pressure distribution function:
$H(\theta) = \cos^2(\theta)$
Determine the directivity factor and directivity index in the direction $\theta = 30$.

b- If two acoustic sources emit sound with levels of intensity of 80 and 90 dB. Find the combined sound intensity level?

Problem number (3) **15 Marks**

a- Deduce an expression for the carbon microphone response and discuss how can we increase it?

b- What are the advantages and disadvantages of piezoelectric microphones?

Complete the following sentences:

1- The whizzer cone ..... the high frequency response of the driver and broadens its high frequency directivity
2- The main cone in a whizzer design is manufactured so as to flex .....in the outer diameter than in the center.
3- Since the whizzer cone is smaller than the main diaphragm, output ..... at high frequencies is improved relative to an equivalent single larger diaphragm.
4- A ..... is a woofer driver used only for the lowest part of the audio spectrum: typically below 120 Hz.
5- Many subwoofer systems include power amplifiers and....., with additional controls relevant to low frequency reproduction.
6- A ..... is a driver that reproduces low frequencies.
7- Used in multi-driver speaker systems, the ..... is a device that separates the input signal into different frequency ranges suited to each driver.
8- Some hi-fi and professional loudspeaker systems now include ..... circuit as part of an onboard amplifier system.
9- The simplest driver mount is a ..... with the drivers mounted in a hole in it.
10- A ..... enclosure prevents transmission of the sound emitted from the rear of the loudspeaker by confining the sound in a rigid and airtight box.
11- A rigid enclosure internally reflects sound which can then be transmitted back through the loudspeaker .....
12- Any speaker mounting scheme will cause ....., causing peaks and dips in the frequency response.
13- ..... speakers are the oldest form of loudspeaker system, having been used from very early for cylinder recording players.
14- ..... speakers use a shaped waveguide in front of or behind the driver to increase the directivity of the loudspeaker.
15- ..... speakers are frequently used as beepers in watches and other electronic devices, and are sometimes used as tweeters in less-expensive speaker systems.

Good luck

Course Title: Electronic Communication Systems | Course Code: EE3202 | Year: 3rd
Date: 15/6/2010 (Second term) | Allowed time: 3 hrs | No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...Neat answers and boxed results are appreciated)

Question 1

(a) Explain the fundamental limitations of any communication system.
(b) List the major types of external and internal noise.
(c) Define the thermal noise. Derive an expression for thermal power in a resistor at temperature T °K.
(d) Calculate the noise voltage at the input of television RF amplifier, using a device that has a 200 ohm equivalent noise resistance and 300 ohm input resistor. The bandwidth of amplifier is 6 MHz and temperature 17°C.

Question 2

(a) List the benefits of a superheterodyne over a TRF receiver.
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Question 3

Design a FDMA system for multiplexing 4 signals. Three of these signals are band-limited to 4 kHz, while the fourth one is band-limited to 12 kHz. The first carrier available is 200 kHz and a guard band of 1 kHz is used.
(a) Draw the spectrum of the composite signal and determine the required bandwidth if DSB and SSB are used.
(b) Sketch the block diagram of the transmitter.
(c) Sketch the block diagram of the receiver.

Question 4

(a) Sketch the block diagram of Stereophonic FM (transmitter and receiver). Sketch the spectrum of signal output at each block diagram.

(b) Design the block diagram of an Armstrong FM modulator to generate an FM carrier with a carrier frequency of 98.1 MHz and Δf of 75 kHz. A narrow band FM generator is available at a carrier frequency of 100 kHz and a frequency deviation of 10 Hz. The adjustable frequency range for oscillator is from 10 to 11 MHz.

(c) Explain the function of AFC.

(d) Explain the function of PLL as FM detector.

Best Wishes of Success